**COMPUTER SCIENCE, BS, CONCENTRATION IN INFORMATION SECURITY**


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Program Maps for Natural Sciences, Mathematics, and Engineering ([https://programmap.csub.edu/academics/interest-clusters/4e942a6e-b8e4-4b60-a1ae-334235acc581/](https://programmap.csub.edu/academics/interest-clusters/4e942a6e-b8e4-4b60-a1ae-334235acc581/))

**Program Description**

Computer Science is a constantly evolving discipline. To quote the Association for Computing Machinery, “Computer Science is not simply concerned with the design of computing devices—nor is it just the art of numerical calculation. Computer Science is concerned with information in much the same sense that Physics is concerned with energy; it is devoted to the representation, storage, manipulation, and presentation of information in an environment permitting automatic information systems.”

The Computer Science major at CSUB has three pathways that lead to a B.S. in Computer Science. The traditional Computer Science program follows the guidelines recommended by the Association for Computing Machinery (ACM). The Computer Information Systems concentration is intended for training application programmers or for those who wish to apply computer science in another discipline. The Information Security concentration is intended for students who wish to pursue a career in information assurance and security, either with government agencies or with industry. Students in the three pathways will take different advanced courses of their choice. A Computer Science minor is also offered.

The Computer and Electrical Engineering and Computer Science Department moved into a new building in Fall 2008. The department administers its own local area network which includes multiple Unix/Linux servers, two software programming labs, a walk-in lab/tutoring center, one advanced workstation lab, an isolated network lab, an AI/visualization lab, a DSP/communications lab, one digital electronics hardware lab, a power systems/electronics lab, and a robotics/control systems lab. There is also a departmental library/major study room available to students.

An important goal of the department is to enable students to work much more closely with faculty than they would be able to at larger universities.

A detailed description of student learning goals and objectives can be found at [https://www.cs.csub.edu/abet/](https://www.cs.csub.edu/abet/).

**Academic Regulation**

A grade of C- is the minimal grade acceptable for progression in the CMPS 2010 Programming I: Programming Fundamentals and CMPS 2020 Programming II: Data Structures and Algorithms sequence.

**Program Requirements**

This concentration is intended for students who wish to pursue a career in information assurance and cyber security, either with government agencies or with industry.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Units</th>
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<tbody>
<tr>
<td><strong>General Education Requirements</strong></td>
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<tr>
<td>First-Year Seminar (FYS)</td>
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</tr>
<tr>
<td>Lower Division Area A: Foundational Skills</td>
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<tr>
<td>Lower Division Area B: Natural Sciences</td>
<td></td>
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<tr>
<td>Lower Division Area C: Arts and Humanities</td>
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<tr>
<td>Lower Division Area D: Social and Behavioral Sciences</td>
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<td>Lower Division Area E: Student Enrichment and Lifelong Learning (SELF)</td>
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<td>Lower Division Area F: Ethnic Studies</td>
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<td>American Institutions: Government and History</td>
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<tr>
<td>Junior Year Diversity &amp; Reflection (JYDR)</td>
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<tr>
<td>Graduation Writing Assessment Requirement (GWAR)</td>
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<tr>
<td>Upper Division Thematic Area C and D</td>
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<td>General Education Capstone</td>
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<tr>
<td>General Education Subtotal</td>
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**Major Requirements**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Units</th>
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<tbody>
<tr>
<td><strong>Lower Division</strong></td>
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<tr>
<td>CMPS 2010</td>
<td>Programming I: Programming Fundamentals</td>
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<tr>
<td>CMPS 2020</td>
<td>Programming II: Data Structures and Algorithms</td>
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<tr>
<td>CMPS 2120</td>
<td>Discrete Structures</td>
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<tr>
<td>CMPS 2240</td>
<td>Computer Architecture I: Assembly Language Programming</td>
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<td><strong>Upper Division</strong></td>
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<tr>
<td>CMPS 3120</td>
<td>Algorithm Analysis</td>
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<tr>
<td>CMPS 3140</td>
<td>Theory of Computation</td>
<td>3</td>
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<tr>
<td>CMPS 3350</td>
<td>Software Engineering</td>
<td>4</td>
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<tr>
<td>CMPS 3420</td>
<td>Database Systems</td>
<td>4</td>
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<tr>
<td>CMPS 3500</td>
<td>Programming Languages</td>
<td>3</td>
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<tr>
<td>CMPS 3600</td>
<td>Operating Systems</td>
<td>4</td>
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<tr>
<td>CMPS 3620</td>
<td>Computer Networks</td>
<td>4</td>
</tr>
<tr>
<td>CMPS 3640</td>
<td>Distributed and Parallel Computation</td>
<td>3</td>
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<tr>
<td>CMPS 4910</td>
<td>Senior Project I</td>
<td>2</td>
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<tr>
<td>CMPS 4928</td>
<td>Senior Project II</td>
<td>2</td>
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<tr>
<td><strong>Information Security Elective Courses</strong></td>
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<tr>
<td>Select 12 units from the following:</td>
<td>12</td>
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<tr>
<td>CMPS 2650</td>
<td>Linux Environment and Administration</td>
<td>4</td>
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<tr>
<td>CMPS 3560</td>
<td>Artificial Intelligence</td>
<td>4</td>
</tr>
<tr>
<td>CMPS 3650</td>
<td>Digital Forensics</td>
<td>4</td>
</tr>
<tr>
<td>CMPS 4450</td>
<td>Data Mining and Visualization</td>
<td>4</td>
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<tr>
<td>Course Code</td>
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<td>Units</td>
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<tr>
<td>CMPS 4510</td>
<td>Vulnerability Analysis</td>
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<tr>
<td>CMPS 4620</td>
<td>Network and Computer Security</td>
<td></td>
</tr>
<tr>
<td>MATH/CMPS 4300</td>
<td>Applied Cryptography</td>
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**Required General Cognate Courses**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
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</thead>
<tbody>
<tr>
<td>MATH 2510</td>
<td>Single Variable Calculus I</td>
<td>4</td>
</tr>
<tr>
<td>or MATH 2310</td>
<td>Single Variable Calculus I for Engineers</td>
<td></td>
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<tr>
<td>MATH 2520</td>
<td>Single Variable Calculus II</td>
<td>4</td>
</tr>
<tr>
<td>or MATH 2320</td>
<td>Single Variable Calculus II for Engineers</td>
<td></td>
</tr>
<tr>
<td>MATH 3200</td>
<td>Probability Theory</td>
<td>4</td>
</tr>
<tr>
<td>PHIL 3318</td>
<td>Professional Ethics</td>
<td>3</td>
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</tbody>
</table>

**Global Intelligence and National Security (GINS) Required Cognate Courses**

Select one GINS Analytical Tools course from the following: ²

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
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</thead>
<tbody>
<tr>
<td>CRJU 3500</td>
<td>Profiling Violence</td>
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</tr>
<tr>
<td>ECON/MIS 3200</td>
<td>Introduction to Geographic Information Systems</td>
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<tr>
<td>GEOL 4050</td>
<td>GIS for Natural Sciences</td>
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<tr>
<td>MIS 4100</td>
<td>Information Security and Privacy</td>
<td></td>
</tr>
<tr>
<td>SOC 4010</td>
<td>Social Changes and Social Movements</td>
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</tbody>
</table>

Select 8-9 units of GINS upper division focus area courses from the following: ³

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
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<tbody>
<tr>
<td>CHIN 1000</td>
<td>Chinese I</td>
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<tr>
<td>&amp; CHIN 1001</td>
<td>and Chinese I Lab</td>
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<tr>
<td>CHIN 1010</td>
<td>Chinese II</td>
<td></td>
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<tr>
<td>&amp; CHIN 1011</td>
<td>and Chinese II Lab</td>
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<tr>
<td>CRJU 4340</td>
<td>Terrorism</td>
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<tr>
<td>HIST 3150</td>
<td>Twentieth-Century America</td>
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<tr>
<td>HIST 3310</td>
<td>Revolutions in Latin America</td>
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<tr>
<td>HIST 3410</td>
<td>The Rise of Islamic Civilization, 570-1258</td>
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<tr>
<td>HIST 3420</td>
<td>Science, Technology, and Engineering in Islamic History, 758-1406</td>
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<td>HIST 3490</td>
<td>Modern China</td>
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<tr>
<td>HIST 4510</td>
<td>The History of European Empires 1500-2000</td>
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<tr>
<td>PLSI 3040</td>
<td>International Relations</td>
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<tr>
<td>PLSI 3320</td>
<td>Government and Politics of China</td>
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<tr>
<td>PLSI 3330</td>
<td>Global Security Issues</td>
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<tr>
<td>PLSI 3340</td>
<td>Government and Politics of Latin America</td>
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<tr>
<td>PLSI 3350</td>
<td>Government and Politics of the Middle East</td>
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<tr>
<td>PLSI 3380</td>
<td>Politics of International Terrorism</td>
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<tr>
<td>PLSI 3610</td>
<td>American Foreign Policy</td>
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<tr>
<td>PLSI 3620</td>
<td>Media, Propaganda, and Public Opinion</td>
<td></td>
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<tr>
<td>PLSI 3630</td>
<td>Political Psychology</td>
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<tr>
<td>SOC 4020</td>
<td>Globalization and Social Change</td>
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</table>

**Major Subtotal** 86-88

**Additional Units Needed Towards Graduation** ⁶

<table>
<thead>
<tr>
<th>Units</th>
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<tbody>
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<td>0-2</td>
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</tbody>
</table>

**Total Units** 118-122

¹ At least one course must be at the 4000-level.

² If a Geographical Information Systems (GIS) Tools course is not available, CMPS 3480 Computer Graphics, ECE 4460 Image Processing or ECE 4470 Computer Vision may be substituted for ECON 3200 Introduction to Geographic Information Systems, or GEOL 4050.

³ Other GINS focus area or strategic language courses may be used with the consent of a program advisor.

⁴ Some of the courses required for the Computer Science major also satisfy General Education requirements. Students who complete each of these courses with the appropriate grade will also satisfy the GE requirement, even if they were to change majors:
- CMPS 4928 Senior Project II satisfies the Capstone requirement.
- PHIL 3318 Professional Ethics satisfies UD Thematic Area C and the Computer Science Ethics requirement.
- MATH 2510 Single Variable Calculus I or MATH 2310 Single Variable Calculus I for Engineers with a grade of C- or better satisfies Foundational Skills B4.
- PHIL 3318 Professional Ethics satisfies GWAR

Computer Science majors have the following General Education Modifications (GEMs), which means they do not have to take courses to satisfy these GE requirements. These GEMs are specific to the Computer Science major and students who change to another major will not keep the modifications:
- LD Area B2 is embedded throughout the curriculum.
- 3 units of LD Area D is met through Computer Science outcomes 2 and 4.
- UD Thematic Area D is met through Computer Science outcomes 2 and 4.

⁵ The SELF requirement may be met by selecting another General Education course with a SELF overlay or by taking a stand-alone course. If a student opts to take a stand-alone course for SELF, the course will add additional units to that student’s general education pathway.

⁶ Additional Units are required to meet the 120-unit requirement for graduation. Any accepted university units may be used to meet this requirement, including stand-alone courses for SELF.

Note: One (1) semester unit of credit normally represents one hour of in-class work and 2-3 hours of outside study per week.